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METHODS

PROPOSED FOR
DECREASING THE CONSUMPTION
OF

T I M B E R,
IN THE NAVY,

BY MEANS OF PROLONGING THE DURATION OF
OUR SHIPS OF WAR;

WITH
OBSERVATIONS ON FASTENING SHIPS
WITH IRON KNEES:

TO WHICH ARE ADDED,
SOME GENERAL REMARKS ON THE PRESENT
TIMBERED STATE OF THE KINGDOM;

IN
A L E T T E R

ADDRESSED TO THE
Right Hon. JOHN, EARL OF CHATHAM,
First Lord Commissioner of the Admiralty.

TOGETHER WITH
A L E T T E R
Addressed to the Honorable COMMISSIONERS of the NAVY,
ON THE
Way of KEEPING, SEASONING, and CONVERT-
ING TIMBER, before it is used in Ship-building.

WITH
OBSERVATIONS on the SAP of OAK TREES.

By THO. NICHOLS,

PURVEYOR OF THE NAVY FOR PORTSMOUTH DOCK-YARD.

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THE HISTORY OF THE

REIGN OF

CHARLES THE FIRST

BY

JOHN BURNET

OF

THE UNIVERSITY OF OXFORD

IN TWO VOLUMES

LONDON

Printed by J. Streater, at the

Sign of the Gun, in St. Dunstons Church-yard

1679

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TO

THE RIGHT HONORABLE

JOHN, EARL OF CHATHAM,

FIRST LORD COMMISSIONER OF THE ADMIRALTY.

MY LORD,

FROM having by long experience obtained some knowledge of the timbered state of this country, and the supply of Timber which is necessary to support the shipping of our Navy and Commerce, I am thoroughly convinced that the demand very much exceeds the growth; and if some effectual means are not immediately taken, either to lessen the consumption of Oak Timber or

to. increafe its growth, I fear that the time is not far diftant when we fhall be greatly diftrefled for the want of this useful article.

From the account published by the Commissioners of the land revenue, in their eleventh report, there appeared to be, at the end of the year 1788, no lefs than 413,667 tons of fhipping in the Navy, which muft be built over, at furtheft, in every fifteen years, to maintain that quantity of tons; as it is found that the medium duration of our men of war, which (as ftated by the navy board) are built in the King's yards, is about fifteen years: and it is found that it will, upon an average, take about two loads of Timber to build a ton of King's fhipping: which of courfe will make an annual confumption of 55,155 loads of Timber. The Eaft India Company's fhipping, at the prefent time, (1792) contains 79,913 tons; to fupport which, will make an annual confumption of

8,300

8,300 to 10,000 loads. The tonnage of shipping, in the merchants' service, transports, victualling, ordnance, customs, excise, and post-office, on the 30th September 1790, was no less than 1,480,990: to maintain which, will make an annual consumption of 113,074 loads; allowing the whole tonnage to be built over once in every twenty years, and allowing a load and a half of timber to build a ton. So that from this statement (which perhaps is near the truth) it appears, that it will require 177,379 loads of timber, to be supplied annually, to support the whole of the shipping of this country, in its present state; which has increased one-third since the accession of his Majesty in the year 1760. This consumption, together with what Oak timber is used in house-building, mill-work, engines, canals, coopers'-work, lighters, barges, boats, &c. from my own observations, and from all the information I have
been

been able to collect, far exceeds the annual growth.

Having been constantly employed in travelling over different parts of the kingdom for these last twenty years, to collect Timber for the navy, I have of late, with grief observed a great diminution in the stock of growing timber, particularly of that which is applicable to naval uses ; so much so that I do not believe that there is one tenth part of the quantity there was twenty years ago. If the Timber in the kingdom continues to decrease in this rapid manner and there is too much reason to suppose it will, as the shipping continues to increase and as there are no effectual means taken either on the crown lands or private estates to keep up a succession sufficient to answer the increased demand for it, the consequence must be obvious and alarming, and calls for some effectual steps to be immediately taken to lessen the consumption of Timber, or to

increase

increase its growth, in order to secure the supply necessary.

The great decrease of the stock of Oak Timber standing in the kingdom, be assured, my Lord, is not imaginary, but confirmed by all the Navy Purveyors in their Reports made seven years ago, from a general survey taken by order of Government, as well as by the Commissioners of the land revenue, in their eleventh report, who have taken infinite pains to ascertain the timbered state of the country.

A very eminent writer (Dr. Smith) has observed, that "the quantity of every commodity which human industry can either purchase or produce, naturally regulates itself, in every country, according to the effectual demand, or according to the demand of those who are willing to pay the whole rent, labor, and profits which must be paid in order to prepare and bring it to market." This I presume will
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not hold good with respect to Timber, as it requires upwards of an hundred years to bring it to perfection, and of course the quantity necessary to supply the market cannot be regulated of a sudden, which in most other things it may ; therefore, a scarcity of Timber may happen before there is time to bring forward a stock sufficient to furnish the demand for it.

I have already had the honor of humbly attempting to point out to your Lordship the means of increasing the Growth of Oak Timber in this country ; I now humbly beg to address your Lordship upon a subject which I conceive to be of equal importance which is that of lessening the Consumption of it in the Navy ; and this, I am of opinion may be easily effected, by increasing the duration of our ships of war : for if, instead of their ordinary duration of fifteen years it could be prolonged to twenty-five or thirty years, what a vast object this would

be to the public, not only in lessening the expence of the navy, but the saving of Timber; and I verily believe that this great purpose may be accomplished, by strictly attending to a few particulars in the building of the ships; attention to them after they are launched, and the management of the timber with which they are constructed.

The first thing which I would humbly recommend, is the proper seasoning and management of the Timber, previous to its being converted for immediate use; the mode of doing which I have endeavored to point out in a letter to the Navy-board, of the 23d of February last; (a copy of which, with some additions, I herewith subjoin, and humbly beg to lay before your Lordship.)

Secondly, I would, as I have had the honor of doing before, (and have the satisfaction to find that the Navy-board have done the same,) most strenuously recommend the building our men of war in the dry, under

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sheds,

sheds, being thoroughly persuaded that it would be attended with very beneficial consequences, as I believe it would contribute very much to that desirable end of prolonging their duration. There can be but little doubt that, in the present mode of building ships in the open air, by which they are so much exposed to the wind, rain, and sun, they receive so much damage that the first foundation of their decay is begun before they are launched, and I conceive, is one of the principal causes of their short duration; whereas, if they were to be built under cover, this great evil would be overcome; and if they were also to stand some time in their frames, and be then planked up, with the holes all bored for the tree-nails, and as many as can be with convenience left open, for at least twelve months, (as recommended by Mr. SNODGRASS, and actually practised in building of the ships for the East India Company's service). If

ships

ships were to be built in the dry, and treated in the manner here described, it would be the means of effectually drawing off the juices of the timber, and contribute very much to increase its duration; and if, in the progress of their building, passages were made between all the broad surfaces that were brought in contact (which was a practice in use formerly, and called snail-creeeping); but this should be carefully done, so as not to weaken or injure the work, and at the same time to admit as free an accession of air as possible to every part, as well as to let off the juices; and I would particularly recommend that large beams should have holes bored in them from end to end. For it is found that after Oak Timber is made perfectly dry, and placed in a free, open air, it will endure for ages; but the great difficulty has always occurred in drawing off the juices from large timber; and I have discovered, experimentally, that when Oak

has been made perfectly dry, it has lost one-third of its original weight; but this can only be done by slow and gradual means; and, in my opinion, the first necessary step to be taken towards effecting this end, is that of keeping the Timber rough in its sap, three or four years before it is converted: and that it will receive great benefit by this mode of treatment, is a fact clearly established by experience. When Oak Timber is converted soon after it is felled, the exterior parts, from being exposed to the sun and wind, have their pores suddenly contracted and closed, whereby the internal juices are locked up, which soon ferment, and rottenness is the certain consequence; or, very frequently, the Timber cracks or splits; into which cracks, or fissures, the wet soon penetrating, is sure to produce rottenness, in a short time. The reason why small ships last so much longer than large, is because the Timber of which they are built is so

so much less, and of course easier and sooner seasoned. I was the other day called upon to survey a vessel of ninety tons, which had been launched twenty-eight years, and her bottom and timbers, which had never been shifted, were as sound and good as could be.

JOHN STRANGE, Esq. late British minister at *Venice*, says, in his answers to some questions proposed to him by the Commissioners of the land revenue, that the Venetians build their ships under sheds, and that they have now eighteen large ships (that is of eighty guns each) on the stocks, in the arsenal at *Venice*; three-fourths of the whole have been there fifty-nine years, and some of them are still only in their frames; that they do not show any outward marks of decay, but that their timbers are evidently shrunk very much; that the whole moisture and sap being so thoroughly dried up and withered that the wood must become brittle and would be apt to splinter in an action.

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I have no doubt but, as the timbers in the frames of the ships appear to be sound, that they are so; if they were otherwise, it must be discovered when the holes come to be bored through them for fastening on the planks, and of course they would be condemned and thrown away, which does not appear to be the case. And the evil which he apprehends will arise from shot passing through their sides, from the wood being so perfectly dry, does not appear to me likely to be greater than what commonly happens in other ships; for the splinters which are made from shot passing through the sides of ships, in general, arise from the inside plank; which plank is, usually, dry; at least it becomes so in a few years after ships are launched.—This was clearly exemplified by the effects from the late gallant action between the *La Nymphe* and *Cleopatra* frigates. Nor do I imagine that the ship's timbers are so much shrunk

as

as Mr. STRANGE supposes them to be; for we find, by experience, that Oak Timber does not lose a great deal of its bulk by drying; and, after it is made perfectly so, it will cease to lose any more. I think it may be fairly concluded from the whole of Mr. STRANGE'S account, that there would be great utility attending the building of ships under sheds, as they do at *Venice*, under proper regulations; but by keeping them so long on the stocks must, in a great measure, destroy the advantages that would otherwise result from it.

In order to prolong the duration of our ships of war, and lessen the Consumption of Timber, the Commissioners of the land revenue, among other things, have recommended, that Oak Trees intended for naval uses should be stripped of their bark, standing, and remain in that state three years before they were felled. If this mode could be brought into general practice, which in
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the present timbered state of the country is by no means probable, I think it would be attended with very beneficial effects; as perhaps it would be found to be the best way of seasoning Timber, previous to its being converted for immediate use. But the notion which the Commissioners entertain, that by this operation of stripping Oak Trees standing, and letting them remain so for three years, the sap will be converted into useful timber, is without foundation, and contradicted by experience.

As Iron Knees have been successfully introduced as fastenings, in the East India Company's ships, by Mr. SNODGRASS, instead of Oak, the Commissioners of the land revenue, through him, have been induced to recommend them for fastening of our men of war; but as the adoption of this mode may be attended with very great and serious consequences to our navy, it certainly ought not to take place, in an extent

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five manner, but upon the clearest proofs of its utility. From giving this subject all the consideration in my power, and from attentively examining the state of the iron fastenings on board several india-men, I am perfectly satisfied that, however well Iron Knees are manufactured, they are much inferior to those of Oak; and of this opinion are all the ship-builders with whom I have conversed, except Mr. SNODGRASS. As Iron Knees spread a much less surface, they cannot keep the parts to which they are united so steady and firm as those of Oak; nor is iron so elastic as wood, therefore more liable to give way and break; nor can Iron Knees be so securely fastened as Oak, being of a much smaller substance; and the holes in the iron must always be larger than the bolts by which they are secured, and therefore subject to work loose, which is exactly the reverse in those of oak. On the whole, I am not able to perceive

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that

that the introduction of Iron Fastenings into our men of war, as proposed by Mr. SNODGRASS and others, can be attended with the least benefit, but may be productive of much mischief. Though this mode of fastening may answer very well for the East India ships, it does not follow that it would for our men of war: the topsides of indian men are much easier secured than those of men of war, particularly of two and three decked ships; there not being in the former that immense weight of guns, masts, yards, topmasts, rigging, sails, anchors, &c. hanging to them, and of course not near the strain upon them, nor are they subject to work so much: yet our men of war, being so secured as they are with lodging and hanging knees, riders, breast-hooks, transom-knees, &c. of good English oak, are enabled to keep the most tempestuous seas in the *British Channel*, and *Bay of Biscay*, in the winter season, without giving out or complaining;

complaining ; and I believe it will be allowed, that more trying situations than these, in general, are not to be found, for determining the strength of ships. The unfortunate *Royal George*, at the time she met with that shocking accident, at *Spit-head*, was four or five and twenty years old, and had stood the seas in the *British Channel*, and *Bay of Biscay*, many winters, like a rock.

My Lord, would it be prudent, would it be consistent with reason, to give up our approved, strong, and secure mode of fastening and uniting our ships of war together with oak, for the precarious, and indeed I may say insecure, way of that with iron ?

It happens very fortunately at the present time, that we are in possession of some instances of the effects arising from fastening men of war with Iron Knees. Several of the ships which have been taken from the French were fastened with Iron hanging-

knees, (the French never make use of lodging-knees, either of wood or iron, as I have seen,) and it is to be remarked that the workmanship of them was executed extremely well. These ships were purchased by government, fitted out, and sent to sea. It was soon found that, by the working of the ships, many of the knees were broke, others got quite loose, with a great many of their bolts entirely cut off. As the ships, from time to time, returned into port, and got into docks, and the state of their knees came to be examined, they were found in such a crazy condition, that they were obliged to be taken down and oak ones put in their stead. These, my Lord, are facts to which I have been a witness; the particulars of which may be known by applying to the records in the dock-yards.

Though several of the ships of war which have been taken from the French were fastened with Iron Knees, many of them were
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also fastened with small, inferior Oak ; as large, good knees, do not arise from the timber with which French ships are built. From this circumstance, however, it is pretty clear that the French prefer Wood to Iron Knees, could they get them, as they might always have had iron had they chosen it.

I am well aware, that the advocates for Iron Fastenings will say, that, as there is a prospect of a scarcity of Oak timber for naval uses, in order to lessen its consumption, Iron Knees ought to be introduced instead of Oak. But I conceive that this expedient would not produce such an effect ; as knee-timber is only applicable to the use of knees, at least with advantage ; and, I am clearly of opinion, that so long as Oak Timber can be procured in this country for the support of the navy, a proportional quantity of knee-timber will arise from it, sufficient for answering all the purposes of carrying on the building of our
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men of war, in the usual approved way, with respect to materials, as heretofore.

I may venture to say, that no more Iron ought to be used in the construction of ships than can be helped, or what is absolutely necessary for their security ; and wherever Wood, or Copper, can be introduced in its stead, it ought, in my humble opinion, to be preferred ; as it is well known that iron seldom fails to decay the wood brought in contact with it ; whereas Copper will preserve it : of which many examples are to be seen at the *Navy-office*.

After our men of war are launched and laid up in ordinary, from various causes, there is generally a humid, foul air, generated in their holds, store-rooms, magazines, between the openings of their timbers and planks, and many other parts ; and this air, if not carried off, becomes so corrupted, as in a short time to rot the parts on which it acts, and I believe has been the cause of
hastening

hastening the decay of many ships : in order, therefore, to guard against such an evil, the most effectual means should always be used to take off this noxious air, and, if possible, to introduce that which is fresh and wholesome in its stead ; and, perhaps, no method is more likely to produce this effect, and contribute to increase the duration of our ships of war, than the fire-stoves which have lately been brought in use on board them, while lying in ordinary, by the direction of the Navy-board.

It is a well-known fact, that houses will sustain more damage from being left empty and locked up, in one year, than they will in ten or fifteen when occupied and fires kept in them.

As it has been lately asserted, by very respectable authority*, “ That, though there “ have been great improvements in every

* The Eleventh Report of the Commissioners of the Land Revenue.

“ other

“ other art, yet hardly any of those lately
 “ made in the construction of ships have ori-
 “ ginated in our dock-yards, but have gene-
 “ rally been copied from ships taken in war.”

This is such a strange and extraordinary assertion, that it cannot be passed over unnoticed by any one that is at all interested or acquainted with the subject. Every person who was acquainted with the forms of our men of war, and state of the navy, thirty or forty years ago, as well as at the present time, must know that vast improvements have been made in the construction of them. It is very true that these improvements did not originate in the dock-yards, as the designs and drawings of ships are never made there, but that they originated with the several successive surveyors of the navy, in whose department this business is wholly conducted.

There is something very singular in the remark, “ That the improvements lately
 “ made

“made on the construction of our ships have
 “generally been copied from ships taken in
 “war.” It is certainly a privilege which
 every artist is allowed to exercise, of adopt-
 ing all the improvements which have been
 made in the art, or arts, which he professes,
 without being degraded or pointed at; for,
 by this means, arts and sciences gradually
 arrive at their highest state of perfection.
 If the Surveyors of the navy have discover-
 ed any thing in the forms or construction of
 any of the ships which have been taken in
 war, or any others, which enabled them to
 improve upon their own designs, I think
 they have shewn their good sense and sound
 judgment in adopting it. Thus much is
 certain, that our men of war have been
 greatly improved within a few years, by the
 surveyors of the navy: our first and se-
 cond rates, (the pride and glory of this
 country and the envy and terror of others,)
 are considered by all experienced sea-officers

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to be as good sea boats as ever swam, as well as the finest ships; and these noble, magnificent floating castles, of which there is nothing that swims, of human art, equal, are all of English composition: there is not a single idea in their whole construction taken from any foreign ship; and it is not in the power of envy to rob the Surveyors of the navy of the merit of composing these superb bodies.

The Commissioners of the land revenue say, " We cannot, indeed, help remarking, " that though this nation excels all others " in extent of commerce and naval power, " and though there have been great im- " provements in every other art," &c. " It " would seem as if some public encourage- " ment were wanting for inventions in this " most important art," &c. (meaning ship- building.) On the contrary, I do not know an art that has been more improved, in this country, than that of ship-building, within these

these thirty or forty years: in the naval department, it most assuredly has been to a very great degree, as I have before observed. The East India Company's ships have been so much improved, that they are now held up as models of perfection; and the ships in the West India trade, from being without symmetry of form, are now well-proportioned, and every way calculated to answer all the purposes for which they are designed. The ships built for the coal trade, are improved more than could have been expected; and the people in the North say, that no ships in the world are equal to them for that service. The guinea-men built at *Liverpool* are so much mended in their forms, and so well adapted to the trade, as to be considered as very fine, useful ships. The packets excel every thing of the kind for elegance, accommodations, and sailing, that was known forty years ago; and the cutters, and fast-sailing vessels, for their construction

and quickness of sailing, are beyond comparison, to those of the same date.

I think, whoever impartially examines the present state of the shipping of this country, with respect to its form and construction, either in classes or collectively, and compares it with that of thirty or forty years ago, must acknowledge it to have attained a high degree of improvement; though, perhaps, far short of what it is capable and what may be expected in a few years: the construction of ships in the naval department being under the immediate management of two Gentlemen (the present surveyors of the navy) who possess very extensive professional knowledge, and who do infinite credit to the important station they fill. It is also to be hoped that very considerable improvements will be struck out in this line, under the patronage of the patriotic Naval Architecture Society, as well as by private builders, many of whom are men of great experience
and

and abilities ; but I conceive that, whatever improvements may be expected or wished for in the forms or construction of ships, are of small importance, when compared with the means of providing Timber for their support, or increasing their duration.

I now beg leave briefly to recapitulate what I have in the course of this address taken the liberty of recommending to your Lordship's consideration, for lessening the Consumption of Timber in the navy by increasing the duration of our ships of war ; and should what I have humbly advanced appear to be founded in reason, and meet the approbation of experienced, professional men as well as your Lordship, I shall not be without hopes of seeing it carried into execution, and that the public will be eventually benefited by it.

First, That all Oak Timber intended for ship-building should be sent to the building-yards,

yards, rough hewed only, and remain in that state three or four years before it be converted to the purposes to which it may be applicable.

Secondly, That all men of war may be built in the dry, under sheds, and remain complete in their frames from one to three years, according to the size of the ship, and then to be planked up, and all the tree-nail holes bored, and left open from one to two years; after which, the ships to be finished as soon as may be convenient. And when laid up in ordinary, and indeed at all times, if possible, to be kept constantly aired with fires.

If these few things were attended to, and faithfully carried into practice, I am thoroughly persuaded that it would be the means of producing the very desirable end suggested; that of increasing the duration of our ships of war, to the full period I have before mentioned: and the expence incurred

red in the execution of this plan would be very soon repaid, by the great good that would result from it.

Nothing is more extravagantly wasteful, or enormously expensive, than hastily building or repairing ships with green timber: the rapid decay occasioned by this practice, is almost past belief. I remember that, lately, a sixty-four-gun ship was built, in this neighbourhood, with green timber that was very good in quality: from the time of her being launched to her being taken into dock, was only six years, and at this period she was found extremely rotten in every part, and underwent a very large and thorough repair. Indeed, the destructive effects produced by this mode of building and repairing of ships, are too well known to need any explanation of mine, and most assuredly ought to be avoided if possible. Every rational means should be pursued for seasoning of the timber and keeping ships dry,

dry, while building or repairing, that can be devised; for on the attention to, or neglect of these, will, I conceive, in a great measure, depend the long or short duration of our ships of war: and should the ruinous system of hastily building and repairing ships with green timber, in the open air, be continued, it must in a short time extirpate all the timber in the kingdom that is applicable to naval uses.

These are facts, my Lord, founded on the clear testimony of experience, which, I humbly presume, call for your Lordship's most serious attention.

The very great advance lately made on the price of Oak Bark, together with the increased demand for small Oak Timber, and the prices given by Government for large timber not being sufficient to induce Gentlemen to let their trees stand till they become of a size fit for naval purposes, added to our improving state in agriculture, will,

will, I fear, be the means of hastening the destruction of most of the Oak Trees in the kingdom, on private estates. The inconveniences and injury which the trade and commerce, as well as the navy of this country, would experience by such an event as the want of Timber, as well as of Oak Bark, would be greater than can be easily imagined; tho' some respectable characters have suggested, that, if this should happen, we may be supplied with timber from foreign countries. But would it be wise or prudent to trust to uncertain and precarious markets for the supply of an article upon which the very existence of this country, as a maritime power, depends, particularly as it is known that no other country produces Timber of equal goodness for ship-building as our own? Certainly not; if we have the means of furnishing the necessary demand within ourselves: which, I humbly conceive, we have. First, by Government's increasing the prices of

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large

large Timber, so as to make it worth Gentlemen's attention to grow and let it stand till it comes to maturity or of sizes fit for naval uses; and, secondly, by immediately setting about to improve and cultivate the Forest Lands for the growth of Timber, to the extent of which they are capable; besides attending to what I have before recommended.

If, in the course of this address, I have been led to animadvert upon a few things which have been advanced to the public by the Commissioners of the land revenue, respecting timber and ship-building, I trust it will not be considered that it proceeded from want of respect, or with the most distant view of detracting from the merit of their labors, but from a conviction that they have essentially erred in some particular points, in treating of these subjects, which may have a tendency to mislead in some things of great consequence; nor that I
impute

impute their errors to any want of attention, labor, or ability, but from their not having acquired a competent knowledge of these subjects by their own practice and experience, and from the necessity they were under to rely on others for a great deal of their information from which they have probably formed some of their opinions: this considered, there can be no wonder that they should have been deceived in some instances where their inquiries have been so extensive, and from consulting such a number of people. On the whole, no person can entertain a higher regard for their very laborious, valuable, and numerous reports, than I do; and am of opinion, if attention were paid to the general information and advice they contain, it would operate very much to the glory and advantage of this country.

I humbly beg that your Lordship will be pleased to consider this address with all its

imperfections as coming from one whose greatest ambition is that of promoting the welfare of the Navy, and whose greatest pleasure would arise from being instrumental in improving it,

I am,

With great deference and respect,

Your Lordship's most humble servant,

THO. NICHOLS.

REDBRIDGE,
20th JUNE, 1793.

TO
THE HONORABLE
COMMISSIONERS OF THE NAVY.

HONORABLE SIRS,

PRESUMING that in the present condition of this country, with respect to the growth of Timber, the raising of Oak for the support of our navy and commerce will naturally be the first object of attention to the departments more immediately charged with those important concerns, I humbly conceive that the judicious management and conversion of such timber, in the view of preserving and applying it so as to obviate all unnecessary waste and decay, will be as naturally the second object of their regard.

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These purposes I may venture to say can in no way be so effectually accomplished, as by bringing the timber in a rough hewed state to the building-yards wherein it is to be used. The greater the choice of rough timber in such yards, and the more it is spread about, so as the different forms and sizes may be seen and easily got at, and the greater variety of ships of different magnitudes on which it may be used, the greater will be the profit resulting from a skilful application of each piece to the greatest advantage; always remembering that such application can be expected only from men of sound judgment and long experience.

Every builder with whom I have conversed on this subject, has without hesitation testified an absolute preference of the rough hewed to any other form; and, with exception of a very few instances, this has been the form in which all the private builders during the last war, have chosen to purchase their

their timber, and have sent it to their yards for building ships on Government's account. Had it been more advantageous to fide or convert the timber at the places where it grew, it cannot be easily conceived that persons of so much experience would have neglected that method, to the injury both of their fortunes and reputation.

I am aware of all that has been suggested by the advocates for fiding and moulding timber in the woods, for ship-building; and after allowing to their arguments the utmost force which they will bear, I am not afraid to affirm, that their system is not reducible to practice, with benefit to the public. The considerable practice which I have had in travelling to collect Timber for naval uses, emboldens me to appeal to the experience of all those who have been employed in the same business, and indeed to the common sense of every one who will be at the trouble of considering for a moment the great variety

variety of forms and sizes to be selected in different and distant parts of the country, and the vast quantity which must be surveyed before a single ship's frame can be obtained in the present timbered state of the kingdom, (to say nothing of beams, plank, thick-stuff, and knees).

It must also be remembered, that, except three or four timbers, every other-one in a ship requires a different mould, and is of a different bevelling, and that every class of ships must have a separate and distinct set of moulds.

Without going any further into this subject at present, I would humbly ask the gentlemen who propose timber to be converted to the various purposes of ship-building, in the country near where it grows, in the different parts of the kingdom, and afterwards to be sent to the dock-yards exactly fit to be put into the ships for which it was designed, how, under the circumstances before-

before-mentioned, it is possible, to be done with advantage to the public.

The only thing, in my opinion, which can be done to timber applicable to naval uses, with any sort of propriety, when it lays at very great distances from the dock-yards, and the expence of the carriage of it in a rough hewed state would be very great, is, to fide and cut it off nearly to the lengths to which its natural growth points, it out to be most applicable in ship-building; and this should be done with the greatest caution and judgment, and by people who are not at all interested about the form or siding of it; for I have known a great deal of timber much injured in its conversion by cutting it off to improper lengths, and giving it that form by hewing, which nature had never given it, on account of its yielding higher prices than when sent to the dock-yards: and I believe, on the whole, it will be found that no timber in the end comes so expensive

as that which is fided in the country on Government's account.

I presume it is of much consequence to know with certainty, whether Oak timber receives injury or is benefited by being laid up in piles, rough hewed in the sap, as it is at the dock-yards, and remaining so 'til it is converted for immediate use, whether for two, three, four, or five years, as it sometimes does.

As experience is the best test for grounding our observations on, we therefore should always avail ourselves of it whenever it offers for our guide.

And it happens very fortunately, that, by long experience, it is unequivocally proved that the best way hitherto known of keeping or seasoning of Oak timber previous to its being used in ship-building, is in a rough hewed state, with its sap on; not only on account of applying it, when wanted, to the most profitable uses, but by lying in the sap,

sap, for two, three, or more years, it seasons gradually, and never splits or opens, as it frequently does when the sap is taken off, by siding or converting it when green, and laying it in piles, and whereby it receives very considerable damage, and very often is entirely spoiled. This is never the case, if it be suffered to season in the sap: for though the sap is certain to perish and moulder away in a few years, let it be treated in whatever manner it may with a view to prevent its perishing, still the heart will be greatly improved by this mode of treatment, and I believe will endure many years the longer for it; and, certainly, when it is converted, it will have the great advantage of not twisting and flying about, as when worked green.

As it is an established fact that timber, by seasoning in the sap, is greatly improved, and is never known to receive any injury thereby, it will follow of course that there

ought to be a large stock kept in that state in the dock-yards. It was very judiciously ordered by the navy-board, some years ago, that there should always be a stock kept equal to three years consumption.

It may also be of some use to inquire, whether Oak timber is generally injured or benefited by being cut in lengths and sided, soon after it is felled, and sent to the dock-yards and there laid up in piles 'til it is wanted for immediate use? We find, by experience, that after it has laid some time in this state, a great deal of it turns out very defective and rotten, particularly at the heart; a circumstance for which I can assign no other cause than ~~by~~ this mode of treatment. The annual coats of wood, of which trees are composed, and which encompass them like hoops, and hold them together, are in part cut off, and the juices flying off very quick, frequently cause them to split or crack, and the cracks or fissures receive the

the wet, which soon brings on rottenness. And though these cracks may not always happen, yet by divesting the trees, before they are seasoned, of their sappy coats, the exterior parts of the wood, or heart, by exposure to the air, suddenly contract and shut up their pores, so as to prevent the escape of the internal juices: hence a fermentation soon begins, and rottenness is still the certain consequence. This does not happen when timber is seasoned with its sap on; the outward parts of the wood not being then suddenly contracted, on account of being sheltered from the sun and wind by the coats of sap which surround it, and the juices freely evaporating through the spongy substance of the sap.

Add to this, the great evil which arises from the perverted conversion which the timber undergoes in the country, in order to make it bring the greatest price.

From the facts here stated, it must appear
evident

evident how necessary it is to have as much timber as possible delivered to the dock-yards, in a rough state, and to remain so 'til it is wanted for immediate use.

On account of the heavy expence attending the carriage of timber, from the interior and distant parts of the country to the dock-yards, in a rough state, and from the necessity of a supply for the demands of the navy, which supply cannot be obtained but by having recourse to those parts, I fear it will be always found requisite to have it in a fided state; a measure I conceive to be wise and prudent, as it will operate as the means of encouraging the growth of Oak timber, in the inland and remote parts of the kingdom. But I would humbly propose, that every temptation should be removed from the merchants that induces them to violate the natural growth of the timber by a forced conversion; which, I judge, may be easily effected by putting the prices

prices in the sided contract entirely aside, and paying for the timber according to its meetings (as is done for rough timber) without having any regard to the forms of it, except to those of compass and strait.--- Indeed the merchants sell it, one to another, all at one price, per foot, whether it be large or small, without any distinction of form or sidings. And I would propose, that the lengths and sidings be marked by the purveyors, on their surveys, and an account thereof inserted in their Reports. And the timber, after being received at the dock-yards, should be put in classes, and kept in salt water, 'til it should be wanted for immediate use, as is the practice in *Holland* and *Spain*. This, I believe, would be the means of preserving it sound and good for any length of time, as timber was never known to decay while it has been so kept: or, perhaps, the burying it in sand might answer all the desired purposes; for,

regard-

regarding the sand as an artificial sap, the timber would thereby be sheltered from wind and sun and prevented splitting or cracking, and the juices would evaporate freely through it, and thereby become well seasoned. Mr. TOWNSEND, in his "Journey thro' Spain," says, that "at Cadiz, to preserve their store-masts from the worms, from the wind, and from the sun, they are buried in sand, and by this simple method are preserved many years."

As the foregoing observations are the result of long experience, and made with no other view than that of promoting public good, I hope that they will not be thought altogether undeserving some attention.--- And in corroboration of what I have advanced, I have the satisfaction to subjoin the opinions of some professional men, whose experience and judgment on this subject cannot be doubted.

Wednesday,

WEDNESDAY, JUNE 15, 1791.

I WAITED on Mr. JOHN NOWLAND, ship-builder, at *Northam*, who has built six frigates for Government, and asked him some questions relative to the moulding of timber, in the woods, for ship-building, and seasoning of it, previous to its being used in ships. He said, that he should always choose that timber should be brought to his yard only rough hewed, as in that state the utmost advantage could be taken in converting of it to the best advantage, and to the purposes to which it was most applicable, which could not be done in the woods, nor could he see how it could be done at all any where but at the building-places.

And he was of opinion, that the best way of seasoning timber before it was converted for immediate use, was letting it remain rough in the sap ; and further remarked, that

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he once purchased upwards of three hundred pounds worth of fided timber, of Mr. HOUNSOM, which had all the appearance of being sound and good, and every way fit for his purpose; but, when it came to be moulded, it proved so defective, that he used only five pieces of it in the frigates he was then building.

FRIDAY, JULY 17, 1791.

HAD a conversation with Mr. DAVID SMITH, one of the converters of timber at the saw-pits in the dock-yard at *Portsmouth*, who has been in that station twenty-three years; and he was clearly of opinion, that the practice of bringing oak timber to the yard in a rough state, laying it in piles in the manner used at *Portsmouth* yard, and suffering it to remain so till it is wanted for immediate use, is the best way of seasoning and keeping timber before it is used in ship-building;

building; that he has found, in the course of his practice, that timber which had been so laid up, though for many years, has, when converted, proved sound and good, and, he thought, much benefited thereby; that among timber which has been sent to the yard in a fided state, and laid up in piles for any length of time, he has found a great deal of it decayed, particularly at the heart: and that, if the fided timber were kept in salt water till it was wanted to be converted for immediate use, it would be preserved sound and good. In confirmation of this opinion, he remembers, that, about twenty-two years ago, when Mr. BUCKNALD was builder at *Portsmouth* yard, he was at the taking up of some pieces of oak timber out of the mud and water, in the boat-house pound, which had been converted for stem and keels on pieces; and they were all as sound and good as could be: they were laid down again in the same place, and were

finally taken up about six or seven years ago, and turned out, upon the second conversion, as sound and as good as timber could be, and he imagined that from first to last they must have laid in the mud and water more than forty years.

He was further of opinion, that it would be greatly to the interest of Government, to have all timber sent to the yard in a rough state, whereby the best and most profitable conversion might be had ; a benefit which cannot be obtained while the timber is fided and cut to lengths in the country.

Mr. ROBERT GILBERT, the other converter of timber, whom I conversed with the same day, but separately from SMITH, and who has been in that station twenty-seven years, was in every respect of the same opinion with SMITH, and declared that he never found any piece of timber injured by lying in piles in a rough state, but, on the contrary, always improved, by
being

being seasoned, as he thought, in the best way possible.

The same day I conversed with Mr. WHITE, the builder, of *Portsmouth* yard; Mr. TIPPETT, his first-assistant; Mr. TREFRY, the second-assistant; and Mr. HOWEL, the foreman of the shipwrights; on this subject; and they were all of the same opinion with SMITH and GILBERT.

SATURDAY, JULY 25, 1791.

I CALLED on Mr. ADAMS, the ship-builder, at *Buckler's-hard*, who I believe has built more men of war for Government than any other private builder in the kingdom.

I asked him some questions concerning the mould of timber in the woods, in the different parts of the country, for the several purposes of ship-building. He said, that it was impossible to be done, [it is to be observed that Mr. ADAMS is allowed to have

have been one of the best converters of timber in the trade ;] and that he always wished to have his timber brought to his yard rough hewed, as in that state he could take every advantage in converting it to the best and most profitable uses ; and, on this account, he ever had it brought rough to *Buckler's-hard*, tho' frequently from great distances by land, at a very heavy expence. He once by necessity had some sided timber brought from *Herefordshire*, but never desired to have any more, if he could procure it rough. He further said, that he never had found timber to receive injury by lying rough in the sap ; and there is now a great quantity which has been in his yard many years in that state, the sap of which is entirely perished, but the spine, or heart, is sound, hard, and good, and has, I believe, improved by so lying.

FRIDAY,

FRIDAY, JULY 22, 1791.

RECEIVED of Mr. PARSONS, the ship-builder at *Bursledon*, an account of the ships which he had built for Government (six in all) two of which were of the line of battle. He at the same time told me, that every man who knew any thing of ship-building must always wish to have his timber for that purpose sent to him in a rough state: he never had it any other way.

SATURDAY, OCT. 8, 1791.

I ASKED Mr. RULE, the builder, of *Woolwich* dock-yard, (at present joint surveyor of the navy,) in what state he would prefer timber for ship-building brought to the yard. He was rather surprized at the question, and said, that every man who knew any thing of the subject must prefer it in a rough state; and he was certain that the
best

best way of keeping timber before it was converted for immediate use, was rough in the sap, as by that mode of treatment it seasoned gradually, and never sustained any damage thereby; whereas that which is laid up sided, or converted, frequently turns out very defective.

Mr. POORE, timber-merchant, at *Red-bridge*, has a great quantity of timber which has laid in his yard, on the ground, many years, only rough hewed, the sap of which is entirely perished, but the heart is sound and good, and much improved by lying, it being thereby extremely well seasoned; and he has built many vessels from timber of this description, particularly a fine ship for the South Sea trade; and there is every reason to believe that they will endure a great deal longer than vessels built with timber not so seasoned.

I was witness, the other day, to the conversion of a piece of timber into a beam
which

which had laid in Mr. POORE's yard, on the ground twenty-four years, which had been rough hewed: the sap of it was quite decayed, but the heart was as sound and good as could be. If it was necessary, I could bring a thousand instances to prove that Oak timber is never injured by lying to season in its sap, but on the contrary greatly improved thereby.

A few years ago, a fifty-gun ship, which was to be called the *Leopard*, was ordered to be laid down in *Portsmouth* yard; which was done, and her frame collected, sided, and moulded, and laid together for some time, and sticks put between the timbers, in order to keep them seperate and for the air to act on them; after this, the ship was ordered to be built at *Sheerness*; and when the timbers came to be examined, about one-third of them proved defective. I only mention this circumstance as a confirmation of the ill effects arising from converting of

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timber

timber and laying of it together in piles, tho' separated as before observed.

Notwithstanding the foregoing observations on the converting and seasoning of timber are built on the firm rock of experience, I find they are flatly contradicted, through the channel of a very laborious and respectable publication ("The Eleventh Report of the Commissioners of the Land Revenue,") by Mr. SNODGRASS, surveyor of the East India Company's shipping. Had Mr. SNODGRASS well considered the nature of laying ships down, moulding of their frames, and how timber is obliged to be gleaned from vast quantities in different parts of the country, for building large ships, I think he never could have replied as he has in his answer to the Commissioners' 21st question, "That the moulding of timber for the various purposes of ship-building, may be done at or near the places where it grows, to great advantage;" and, in his answer to their

their 22d question, “ more especially if converted by contractors !” Had such a mode been practicable with advantage, is it not surprizing that it was not put in execution by the contractors who built so many ships for Government during the late war? And if so, why is it not now done by the builders of the indiamen? The reason is obvious to every man who is well acquainted with ship-building, and has travelled to collect timber for that purpose ; because it is not to be done with advantage : and, in the present timbered state of the kingdom, I cannot see how it can be done at all, when it is considered how large timber lies scattered over the country, and that in almost every parcel which is surveyed, pieces of various forms and sizes are found fitting for ships of different classes, from a sloop to a first-rate. Under these circumstances, I cannot conceive how timber can be manufactured in the places near where it grows, to the several

ral uses in ship-building to which it is most applicable.

Again, had Mr. SNODGRASS given himself the trouble to have examined the real state of the timber which is laid up in piles in a rough state in the dock-yards, and the effects which are produced thereby ; it would have been impossible for him to have cast such an unjust and groundless censure on the officers of the dock-yards, nor have dared to have made to the public so false a declaration as he has done in his answer to the Commissioners' 20th question, by saying, that one-third or more of the timber which is so laid up, is rendered thereby unfit for ship-building. Had he took the necessary pains, as he ought, to have examined into this matter, before he had made this declaration to the public, which at least would have been candid, and what every person, whose object had been the truth would have done ; he then would have found that the
exact

exact contrary had been the fact, and that so far from timber receiving injury, and being rendered unfit for ship-building by being so laid up, it is much improved thereby, by being seasoned in the best way hitherto known, before it is used in ships, and never known to be any ways damaged by lying in that state; and I challenge Mr. SNODGRASS to prove one single instance to the contrary. But, it seems, according to this gentleman, that every thing which is done in a dock-yard must carry with it the marks of speculation and ignorance.

I am, with great respect,

HONORABLE SIRS,

Your humble servant,

THO. NICHOLS.

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A LETTER.

ADDRESSED

'TO THE EDITOR OF THE EUROPEAN MAGAZINE'.

On a New Way of Planting ACORNS.

SIR,

I AM very much obliged to you for your kind letter of the first instant and the inclosed papers, and am greatly flattered by what the Monthly Reviews say of my Pamphlet. You say, that last month you wrote a letter and inclosed the two prints of *Flora Rustica* done under the inspection of *Professor MARTYN*, which I never received, but shall be much obliged to you for them. I have taken the liberty of sending you a drawing of an Instrument which I have contrived for planting Acorns in bushes
of

of all kinds. It is found by experience, that bushes of white and black thorns, holly and brambles, are the best nurseries and protectors of young timber-trees, particularly on open or unclosed lands, such as lanes, commons, hedge-rows, and forest lands; for wherever there is a stock of bushes on such lands, they seldom fail to bring forward sooner or later timber-trees in abundance, of some kind or other, if the soil is friendly and proper for the growth of trees; yet the planting of their seeds must be accidental and very uncertain, as it is only by the birds or some casual means that they are dropped by chance, and not one of a great many may happen to reach the ground so as to strike and produce a plant; of course, it may be many years before any number of plants are brought forth by this means, and I have seen large tracts of land nearly covered with under-wood and bushes with very few timber plants among them. But by the use of
this

this Instrument, the seeds of timber-trees may be planted in any bush, effectually, and with the greatest ease and expedition ; especially Acorns, which it is more immediately calculated to do : and bushes are the fittest places to plant them in, and should never be omitted when the opportunity offers, as the oak requires a guard and defence in its infancy. I have this season planted many Acorns with the instrument, and flatter myself could the use of it be made general, that most of the bushes in the kingdom on uninclosed lands would soon be filled with oak plants, to the great benefit of many individuals, and in time be productive of much public utility : with this view I intend sending one of the Instruments to the " Society for the Encouragement of Arts and Sciences," in *London*, and another to " the Bath Society." I have showed it to many Gentlemen in this neighbourhood, who have been much pleased with it : I have got several of them made ;

so I hope by degrees to get them into common use.

But I would recommend to those who may choose to plant, by this or any other method, to have particular regard in the choice of their Acorns, and to select the largest and finest from the true English Oak: as there are two species of Oak growing common in this country; and it is known from experience, that the wood of the true English is of a superior quality to the other; it being of a firmer texture, stronger, and more durable, and preferable for most uses, particularly that of ship-building. The true English Oak may be easily distinguished from the other species: which, in the *New Forest*, is known by the name of the Durmast Oak. The Acorns of the English Oak grow on fruit-stalks, like cherries, from about an inch to two inches in length, and the leaves sit close to the twig, without the intervention of any foot-stalks; whereas the Acorns

of

of the Durmast Oak grow in clusters, close to the twig, without any foot-stalks, and the leaves are set on short petioles, or leaf-stalks, usually about half an inch in length. *Professor MARTYN*, who has very elegantly described these Oaks, in his "*Flora Rustica*," says, "The Durmast Oak differs very widely "from the true British species, not only "in the essential characteristics of the petiole-leaved and sessile-clustered Acorns, "but in several other remarkable circumstances. The whole tree has much the "air of the chestnut, and is of a freer growth "than the true Oak; the bark is of a lighter "color, and smoother; the wood not so "strong, or of so firm a texture," &c.

I beg to mention a few instances of the advantages arising from encouraging the growth of bushes on uninclosed lands.

I lately surveyed a very fine parcel of timber for the navy, (the purchase of which was upwards of eleven thousand pounds,)

upon an estate belonging to Sir HARRY ST. JOHN, near *Twyford*, that had been entirely brought up on uninclosed lands, (where the tenants of the manor have a right of commonage, and where they depasture a great many cattle,) by the protection of the white and black thorns; and there is now remaining in those very lands, a full stock of fine Oaks in succession, supported and guarded by the same means. There was felled on the same lands, about forty years ago, the like quantity; and one thousand four hundred pounds worth, six years ago: and from the waste lands of another estate, well known in this neighbourhood, there has been sold more than twelve hundred pounds worth of timber a year, for these last twelve or thirteen years; and there is now a great quantity of fine timber remaining.

These are such striking proofs amongst the many that may be adduced of the utility of encouraging the growth of bushes, in
bringing

bringing forward crops of timber trees upon open lands, that it is certainly worth the attention of Gentlemen who wish to improve the wastes of their manors in the most advantageous way; not only for their own private emolument, but for the public good, as well as for the benefit of posterity.

It is to be observed, that there is not more useful Timber for ship-building than what is nursed by bushes on uninclosed lands; it generally being either compass or abounds with good knees.

I am,

Sir,

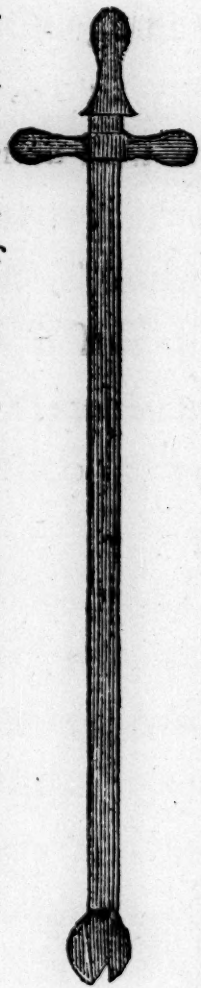
Your most humble servant,

THO. NICHOLS.

The

*The DRAWING of an INSTRUMENT,
by a Scale of $\frac{82}{100}$ of an Inch to the Foot, for
planting ACORNS in Bushes of all Kinds.*

THE way of using the Instrument, is as follows:—First, put it through the bush into the earth, and work it about 'til there is a bed made fit for the reception of the acorn (which is very soon done) then draw it back to the surface, take out the rod and put the acorn into the tube, and immediately follow it with the rod, which will place it about two inches in the ground; move about the Instrument at the same time, gently pressing down the earth with it, and the acorn will be securely planted.



N. B. The Machine for planting Acorns may be bought at Mr. WINSLOW's, Margaret-street, Cavendish-square.

OBSER-

OBSERVATIONS

ON THE NATURE *of the* SAP *of* OAK Trees.

IT is to be observed, that Oak trees increase in their diameters by repetitions of coats of new wood, annually formed between the bark and the coat which was formed the year preceding. At first, this new wood is imperfect, and is called Sap; and trees generally contain from fifteen to thirty of these sappy coats, and occupy a space from about half an inch to four inches
in

in thickness, taken together, according to the slow or quick growth of the trees; and I have found, by experiments, that these sappy coats are nearly of the same weight and texture, throughout, in the same tree. It clearly appears to me, as a tree puts on only one coat a year, only one coat a year is transformed from sap to heart, or perfect wood: so that it is from fifteen to thirty years after the first formation of these coats before they are brought into perfect wood: but they are not gradually brought into this state; if they were, they would be of different weights and textures; which they are not, but are suddenly changed, one a year, from sap to heart. It also appears, that trees, however old, retain the same number of sappy coats they did when young and vigorous, though gradually occupying less space as the trees advance to maturity; as they proportionally decrease in growth, but still continue to put on their annual coats.

coats, however small, so long as they grow at all.

I received from Mr. ADAMS, of *Buckler's-hard*, part of an oak which was stripped of its bark, standing, in *Beaulieu* Manor, in the spring of 1784, and felled in the spring of 1788. The tree appears, by the number of its annual coats, to have been one hundred and ten years old at the time of its being stripped; it contained twenty-one coats of sap, which were in a perishing state; so that the notion which some have entertained that the sappy parts of oak trees become as hard or equal to the heart for strength and durability, by the operation of stripping them standing of their bark and letting them remain 'til they die before they are felled, is chimerical, as is clearly proved by this experiment, and no other information collected from it: there was no comparison made between the strength and density of the wood of this tree and others of the same

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age and size which might have been felled at the time this was stripped, near where it stood, nor others stripped of their barks and felled at the time this was.

The Count De BUFFON has incontestibly proved, by his experiments, that by stripping Oak trees of their bark, standing, and letting them remain 'til they die before they are felled, the heart or perfect wood thereof will be considerably increased in strength and density; and it is also proved by experience, that the sappy part, or imperfect wood, will not be much altered thereby; at first, and while it is green, it will be found harder and stronger than the sap of trees felled in the usual way, but after a little time, and as the juices evaporate and fly off, it will perish and moulder away, as the sap of Oak trees always will do, let them be treated in whatever manner they may with a view to prevent it. Every experienced ship-builder or carpenter well knows, that
 wherever

wherever any Sap is worked with the heart of Oak (as it sometimes is), it will ultimately tend to weaken and injure the building wherein it is used; for however fair and well it may appear at first, it will most assuredly decay in a short time.

For want of examining the original thickness of the Sap of Oak trees, and the progress of its decay, and from finding so much of young trees wasted by the decaying of their sappy coats, (which generally occupies a considerable space, particularly if the trees were very vigorous at the time of their being felled,) some have been led to imagine that by trees laying for any length of time the Sap increases in its thickness, or that part of the heart is transformed into Sap again; which is by no means the fact; and if any part of the heart were subject to such change by so lying, there can be no good reason assigned, why in the process of time

the whole should not undergo the like change: but this is absurd, and contradicted by experience; for after the sappy coats are once formed into perfect wood, it ever remains in that state, until it naturally decays.

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A REFERENCE to PIECES of OAK,

Numbered 1, 2, 3, 4, 5, 6, 7, 8, 9,

Taken from several Trees, in order to point out the great Variety there is in the Thickness of SAP, and the different Number of Annual COATS of which it is composed, according to the quick or slow Growth of Trees.

R E M A R K S.	No. of the Piece.	Thickness of the Sap.	No. of Annual Coats.
		<i>Inch. Part.</i>	
Taken from a Tree which was stripped of its Bark, standing, in the Spring of 1784, and felled in the Spring of 1788; the Tree appears by its annual Coats to have been 110 years old when it was stripped.	1	1 1-8	21
The Sap in a perishing state,	2	2 7-8	27
	3	2 3-8	18
	4	1 3-4	16
	5	0 3-4	24
	6	3 0	20
The Growth extremely slow,	7	0 1-2	30
The Section of a small Oak, 13 years old, all Sap - - -	8	1 7-8	13
This Tree by its annual Coats was 73 years old when it was felled, - - - - -	9	3 3-4	29

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE

For the year ending 31st March 1900

Presented to the House of Commons by Command of Her Majesty

LONDON: PRINTED BY THE STATIONERY OFFICE, 1900.

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Gentlemen desirous of improving their Estates and securing the blessings of peace to generations yet unborn, cannot do a more patriotic act than plant Forest Trees, (the first expence is trifling, the increase in value annually is very considerable); should read and study the following Authors, which may be had of most book-sellers in England, or always at the European Magazine Warehouse, No. 32, Cornhill, where all the scarce Tracts, english and foreign, on this subject, as well as Naval Architecture, may be perused, and of such as there are duplicates purchased.

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